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PATENT
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re PATENT application of:	)	
Daniel David YOUNG et al.	)	Examiner: Erica Cadugan
Application No.: 09/270,688	)	Group Art Unit: 3722
Filed: March 16, 1999	)	Date: June 19, 2002
For: METHOD AND SYSTEM FOR FORMING CUSTOM SHOE INSOLES	)	

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with The United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Commissioner for Patents, Washington, D.C. 20231, on June 19, 2002

By: April Campbell

APPEAL BRIEF

Commissioner of Patents
Washington, D.C. 20231

Sir:

This is an appeal from the decision of the Examiner mailed on September 19, 2001, finally rejecting claims 1, 3, 4 and 6-29 of the above-identified patent application.

A Notice of Appeal was filed on March 19, 2002. A Petition for a three (3) month extension of time and the appropriate fee as set forth in 37 C.F.R. § 1.17(a) was filed on March 16, 2002.

Three (3) copies of this brief are enclosed. A check in the amount of $355.00 covering the statutory fee for the submission of this brief as set forth in 37 C.F.R. §1.17(f) and the Request for an Oral Hearing is also enclosed.

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I. REAL PARTY IN INTEREST

All the named inventors have assigned all ownership rights in the pending application to Three Dimension Systems, Inc. of Suite 718, Bigelow Corporate Center, One Bigelow Square, Pittsburgh, Pennsylvania, 15219-3028, which is the real party in interest.

II. RELATED APPEALS AND INTERFERENCES

The Appellants, their legal representatives, and the assignee are not aware of any other pending appeals or interferences which will directly affect or be directly affected by, or have a bearing on the Board's decision in this appeal.

III. STATUS OF THE CLAIMS:

Claims 1, 3, 4 and 6-29 are pending in the present application. The appealed claims are set forth in Appendix. Claims 2, 5 and 30 have been previously canceled.

IV. STATUS OF AMENDMENTS

In the Advisory Action dated April 23, 2002, the Examiner indicated that the Amendment filed on March 15, 2002, would be entered upon the filing of the Notice of Appeal. A Notice of Appeal was filed on March 19, 2002.

V. SUMMARY OF THE INVENTION

The present invention relates to a system and method for forming a custom-made insert wherein the undersurface of a foot is accurately and quickly measured by laser scanning. The foot is randomly positioned on a laser scanning station. At least one laser scanning unit is passed along an undersurface of the foot. The scanning unit directs at least one line of laser light along the undersurface. The surface coordinates of the undersurface detected by the laser scanning unit are scanned, processed and transmitted to a data processing unit. A custom-made insole is milled based directly from the transmitted surface coordinates.

The system and method of the present invention can be used to manufacture a custom milled insole based on a foot in it's natural, uncompressed state with high three-dimensional accuracy. The placement of the foot in the scanning station is entirely random, i.e., no reference to foot placement is necessary. Moreover, the customer is not required to wear a

compressive sock or other device to obtain the surface coordinates of the foot.

VI. ISSUES

The issues to be considered by the Board of Patent Appeals and Interferences are as follows:

A. Is the subject matter recited in claim 13 anticipated under 35 U.S.C. § 102(b) by U.S. Patent No. 5,088,864 to Yanagida?

B. Would the subject matter recited in claims 1, 4 and 6-29 have been obvious to one having ordinary skill in the art under 35 U.S.C. §103(a) over U.S. Patent No. 5,449,256 to Sundman in view of U.S. Patent No. 5,712,803 to Garuet-Lempirou?

C. Would the subject matter recited in claim 3 have been obvious to one having ordinary skill in the art under 35 U.S.C. §103(a) over U.S. Patent No. 5,449,256 to Sundman in view of U.S. Patent No. 5,712,803 to Garuet-Lempirou and further in view of the prior art description set forth in the specification at page 8, lines 11-15?

D. Would the subject matter recited in claims 1, 7-16 and 20-29 have been obvious to one having ordinary skill in the art under 35 U.S.C. §103(a) over U.S. Patent No. 5,237,520 to White in view of U.S. Patent No. 5,449,256 to Sundman?

E. Would the subject matter recited in claims 1, 3, 4 and 6 have been obvious to one having ordinary skill in the art under 35 U.S.C. §103(a) over U.S. Patent No. 5,237,520 to White in view of U.S. Patent No. 5,449,256 to Sundman and further in view of the prior art description set forth in the specification at page 8, lines 11-15?

VII. GROUPING OF THE CLAIMS

For purposes of this appeal, rejected claims 1, 3, 4, and 6-12 stand or fall together, and rejected claims 13-29 stand or fall together.

VIII. ARGUMENTS

A. Claim 13 is Not Anticipated By Yanagida

Claim 13 recites a system for forming a custom-made insole including at least one scanning station for supporting a foot to be measured. The at least one scanning station includes

at least one movable laser scanning unit for determining coordinates of an undersurface of the foot by directing at least one line of laser light along the undersurface. At least one insole-milling station is in communication with the at least one scanning station. The at least one milling station includes a milling assembly for forming the custom-made insole, and control means for controlling the operation of the milling assembly based upon the coordinates determined by the at least one laser scanning unit.

In contrast, Yanagida discloses an automatic engraving system for automatically engraving the lateral contour of a person's face on a medal. Yanagida's system includes, among other things, two cameras 12A and 12B, each disposed at a position offset from the lateral contour of a face by a predetermined angle and two charge coupled devices including a monitor screen on which the lateral contour of the face is displayed and a number of lattice points being arranged on the monitoring screen. The lateral contour of the face is determined by sequentially measuring a width, a height, and a thickness of the lateral contour of the face at a certain actual point on the latter and sequentially processing the dimensional data derived from the measurements.

Yanagida does not disclose or suggest "at least one scanning station for supporting a foot to be measured, the at least one scanning station including at least one movable laser scanning unit for determining coordinates of an undersurface of the foot by directing at least one line of laser light along the undersurface" as recited in claim 13. As clearly shown in Fig. 3, Yanagida's cameras 12a and 12b are not positioned to scan along the undersurface of a foot that is supported on chair 10. Referring to column 5, lines 36-39, Yanagida explicitly teaches engraving "based on dimensional data on the contour indicative of an upper half of one person or the whole body of one person *as seen from the front side*" (emphasis added). Thus, Yanagida does not disclose each and every element of the claim.

Moreover, one having ordinary skill in the art would not use the device of Yanagida to scan the undersurface of a body part, whether it be a foot, face etc., supported in a chair. In order to accomplish such a task, Yanagida's system would have to be redesigned, or the user would have to stand on his/her head, placing his/her foot directly in the path of cameras 12a and 12b. One having ordinary skill in the art would not be motivated to use Yanagida's system in the manner suggested by the Examiner.

Accordingly, claim 13 is not anticipated by Yanagida and the rejection should be

reversed.

B. Claims 1, 4, and 6-29 Would Not Have Been Obvious to One of Ordinary Skill in the Art Over Sundman in View of Garuet-Lempirou.

1. The Prior Art References, Either Alone or in Combination, Would Not Have Suggested the Features Recited in Claims 1, 4, and 6-29.

Independent claim 1 recites a method of forming a custom-made insole comprising the steps of randomly positioning a foot to be measured on a laser scanning station, and passing at least one laser scanning unit along an undersurface of the foot. The undersurface of the foot is scanned with the at least one laser scanning unit by directing at least one line of laser light along the undersurface. The surface coordinates of the undersurface detected by the at least one laser scanning unit are scanned. The measured surface coordinates are processed and the processed measured surface coordinates are transmitted to a data processing unit. A custom-made insole is milled based on the transmitted surface coordinates.

As set forth previously, independent claim 13 recites a system for forming a custom-made insole comprising at least one scanning station for supporting a foot to be measured. The at least one scanning station includes at least one movable laser scanning unit for determining coordinates of an undersurface of the foot by directing at least one line of laser light along the undersurface. At least one insole-milling station is in communication with the at least one scanning station. The at least one milling station includes a milling assembly for forming the custom-made insole. Control means control the operation of the milling assembly based upon the coordinates determined by the at least one laser scanning unit.

With the method and system of the present invention, the foot is imaged in a natural relaxed state, such that the arch of the foot and other portions of the foot, are specifically not under compression. By imaging the foot in a natural state, non- weight bearing, non-compressed, we get a "true" image of the normal state of the foot. In this manner, the insole will contain an arch support that conforms to the foot, provides the most natural support, and not visa versa.

Sundman does not disclose or suggest "scanning the undersurface of the foot with at least one laser scanning unit by directing at least one line of laser light along the undersurface" of the foot, as recited in claims 1 and 13. Sundman discloses a mill for producing an insole,

whereby the contours of the person's foot is measured via a plurality of pins. Thus, it is the position of the pins which is measured and this data forwarded to the mill of the '256 patent.

Garuet-Lempirou discloses a system for scanning and digitizing a human foot through a transparent base 40. The foot is enclosed in a support stocking to simulate the pressure of the shoe. See column 1, lines 48-65. The foot

> *rests on a transparent plate reproducing as closely as possible the shape of the "insole", which is the piece of leather on which the foot rests in a shoe. It is based on a sheet of glass or a similar material. This arrangement enables the closet possible simulation of the way the foot is really supported in a shoe.* (emphasis added).

Thus, Garuet-Lempirou teaches digitizing the foot to be in the environment that resembles the shoe as close as possible. Furthermore in Garuet-Lempirou, the object to be imaged is described as being under compression loads, the two examples described are a foot constrained by a shoe and a rubber seal of a car door mechanically constrained by its surroundings. This is stated clearly in the abstract's last sentence, "acquisition and digitization of the surfaces of the transparent wall. Applications include acquiring and digitizing the shape of the human foot or a rubber seal for automobile doors when subjected to compression loads."

In Garuet-Lempirou, a plurality of optical sensors Ca1-Ca4 are attached to a cradle 2. The foot remains immobile on base 40 and cradle 2 with the sensors attached thereto moves along axis A, beneath base 40. See column 5, lines 61-67. The base 40 is calibrated and digitized by removing the wall. With the present invention, the transparent wall is *not* digitized and calibration occurs with the transparent plate in place.

Independent claim 17 recites "at least one scanning station including a base having a length for supporting the foot, and at least one movable laser scanning unit for determining coordinates of an undersurface of the foot by directing at least one line of laser light along the undersurface, the at least one laser scanning unit including a first and second side portion extending upwardly from the base along the length thereof."

Sundman, does not disclose or suggest "at least one scanning station including a base having a length for supporting the foot" and "a first and second side portion extending upwardly from the base along a length thereof," as recited in amended claim 17

Garuet-Lempirou also does not disclose or suggest "at least one scanning station

including a base having a length for supporting the foot... the at least one laser scanning unit including a first and second side portion extending upwardly from the base along the length thereof." as recited in amended claim 17. The Examiner appears to consider Garuet-Lempirou's cradle 2, to be the mechanical equivalent of Applicants' base. However, the user's foot is not supported on cradle 2, but rather base 40. Base 40 does not have "a first and second side portion extending upwardly from the base along a length thereof," as recited in claim 17.

The Examiner also appears to be silent with regard to what she considers to be the mechanical equivalent of Applicant's claimed carrier. Claim 15 as originally presented recites that "the at least one laser scanning unit is mounted to a carrier which is movable along a length of the base." If the Examiner considers Garuet-Lempirou's cradle to be the mechanical equivalent of the claimed "base", then what is the structure in Garuet-Lempirou that corresponds to the claimed "carrier" of claim 15?

2. No Reason or Motivation Exists in the Prior Art for Combining the Teachings of the Admitted Prior Art With Gunther in the Manner Asserted by the Examiner

The Court of Appeals for the Federal Circuit has emphasized that "prior art references in combination do not make an invention obvious unless something in the prior art references would suggest the advantages to be derived from combining their teachings." In re Semaker, 702 F.2d 989, 995-96, 217 USPQ 1, 6 (Fed. Cir. 1983).

In the present case, it is the Examiner's position, as stated on page 6, of Paper No. 21, that it would have been obvious to one having ordinary skill in the art at the time the invention was made to have replaced the longitudinal-pin-type foot contour measurement machine taught by Sundman with the laser scanning foot contour measurement device taught by Garuet-Lempirou for the purpose of being able to acquire three-dimensional foot data that takes into account the entire measured surface area rather than just the selected points where the longitudinal pins of Sundman's device contact the foot.

Applicants respectfully submit that no motivation exists in Sundman for substituting the laser-based measuring system of Garuet-Lempirou for Sundman's pin array. Sundman contains absolutely no teaching or suggestion in support of the Examiner's position. The failure to show that each element and limitation of the presently claimed invention is suggested by the prior art constitutes a failure to establish the required prima facie case of

obviousness on which a proper §103 rejection must be based. See, In re Fine, 837 F.2d 1071, 1074, 5 USPQ 2d 1596, 1598 (Fed. Cir. 1988).

Moreover, such a substitution would render Sundman's device unworkable, as the data recovered from any laser measuring device would not be compatible with the pressure measuring data of Sundman's device, and one having ordinary skill in the art could not "invent" Applicant's claimed invention if presented solely with the teachings of Sundman and Garuet-Lempirou. It is well settled that a proposed modification which changes the mode or principle of operation of a reference is unreasonable and amounts to impermissible hindsight reconstruction. In re Ratti, 270 F.2d 810, 123 USPQ 349 (C.C.P.A. 1959). Clearly, Sundman does not provide the required incentive or motivation to substitute laser measured data for pressure measured data. Such modification of Sundman's teachings would only be arrived at, if at all, with hindsight of the present invention.

In view of the above, neither Sundman nor Garuet-Lempirou, either alone or in combination, disclose or suggest the present invention as recited in independent claims 1, 13 and 17. Therefore, the rejection of claims 1, 13 and 17 over the above references should be reversed. As claims 4, 6, 7-16 and 18-29 depend from independent claims 1, 13 and 17, respectively, the rejection of these claims should also be reversed.

C. Claim 3 Would Not Have Been Obvious to One of Ordinary Skill in the Art Over Sundman in View of Garuet-Lempirou and Further in View of the Teachings of the Prior Art Set Forth in the Specification

Claim 3 recites that the "step of scanning the undersurface of the foot comprises directing a non-focused fan-shaped line of laser light along the undersurface and sides of the foot." Neither Sundman nor Garuet-Lempirou disclose or suggest directing "a non-focused fan-shaped line of laser light along the undersurface" of the foot. To cure the deficiencies of the primary references the Examiner relies upon the description of the prior art set forth in the specification at page 8, lines 11-15.

Importantly, no motivation exists, absent Applicant's own teachings, to modify Garuet-Lempirou to direct "a non-focused fan-shaped line of laser light along the undersurface" of the foot. Nor does the Examiner point to any specific teachings in Garuet-Lempirou or the admitted prior art to which would provide any support for the suggested modification.

Applicant respectfully submits that claim 3 is allowable over the prior art of record.

D. Claims 1, 7-16 and 20-29 Would Not Have Been Obvious to One of Ordinary Skill in Art Over White in View of Sundman.

With respect to claim 1, neither White nor Sundman disclose or suggest, "passing at least one laser scanning unit along an undersurface of the foot" and "scanning the undersurface of the foot with the at least one laser scanning unit by directing at least one line of laser light along the undersurface." White's scanner unit derives a topographical image of the customer's foot. It is from this image that the 3-D information is derived by determining the lightness and darkness portions of the image.

Sundman does not cure the deficiencies of White, as it does not teach passing a laser scanning unit along the undersurface of the foot, as set forth fully above. Therefore, the rejection of claims 1, 7-16 and 20-29 should also be reversed.

E. Claims 1, 3, 4 and 6 Would Not Have Been Obvious to One of Ordinary Skill in the Art Over White in View of Sundman .and Further in View of the Teachings of the Prior Art Set Forth in the Specification

As fully set forth above, neither Sundman nor White disclose passing a scanning unit along the undersurface of the foot with "at least one laser scanning unit by directing at least one line of laser light along the undersurface" as recited in claim 1. Since neither of the primary reference teach passing "at least one line of laser light" no motivation exists, absent Applicants own teachings to pass a "non-focused fan-shaped" line of laser light.

The rejection of claims 1, 3, 4 and 6 over the cited prior art should be reversed.

IX. CONCLUSION

In formulating the rejections of the claims under 35 U.S.C. §§ 102(b) and 103(a), the Examiner fails to set forth a prima facie case of obviousness. Accordingly, the rejection of claims 1, 3,4 and 6-29 should be reversed.

Respectfully submitted,

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APPENDIX

1. A method of forming a custom-made insole comprising the steps of:

randomly positioning a foot to be measured on a laser scanning station;

passing at least one laser scanning unit along an undersurface of the foot;

scanning the undersurface of the foot with the at least one laser scanning unit by directing at least one line of laser light along the undersurface;

measuring surface coordinates of the undersurface detected by the at least one laser scanning unit;

processing the measured surface coordinates;

transmitting the processed measured surface coordinates to a data processing unit; and milling a custom-made insole based on the transmitted surface coordinates.

3. The method of claim 1, wherein the step of scanning the undersurface of the foot comprises directing a non-focused fan-shaped line of laser light along the undersurface and sides of the foot.

4. The method of claim 1, wherein the step of measuring the surface coordinates of the foot comprises determining a three-dimensional map of the undersurface of the foot.

6. The method of claim 4, wherein a plurality of laser scanning units are passed along the undersurface and sides of the foot.

7. The method of claim 1, further comprising the step of removably mounting an insole blank to a tray of a milling assembly.

8. The method of claim 7, wherein the step of milling comprises moving a router along a first axis of movement to mill the insole blank along a length thereof.

9. The method of claim 8, further comprising the step of moving the router along a second axis of movement to vary the depth of milling along the insole blank.

10. The method of claim 9, further comprising the step of moving the tray along a third axis of movement to mill the insole along a width thereof.

11. The method of claim 10, wherein the movement of the router and tray along the first, second and third axes of movement is determined by the measured surface coordinates.

12. The method of claim 11, further comprising the step of forwarding the measured surface coordinates from the computer to a plurality of stepper motors, wherein one stepper motor controls the movement of the router along the first axis of movement, a second stepper motor controls the movement of the router along the second axis of movement and a third stepper motor controls the movement of the tray along the third axis of movement.

13. A system for forming a custom-made insole, comprising:

at least one scanning station for supporting a foot to be measured, the at least one scanning station including at least one movable laser scanning unit for determining coordinates of an undersurface of the foot by directing at least one line of laser light along the undersurface;

at least one insole-milling station in communication with the at least one scanning station, the at least one milling station including a milling assembly for forming the custom-made insole; and

control means for controlling the operation of the milling assembly based upon the coordinates determined by the at least one laser scanning unit.

14. The system of claim 13, wherein the at least one scanning station includes a base for supporting the foot, the at least one laser scanning unit being movably disposed beneath the base.

15. The system of claim 14, wherein the at least one scanning unit is mounted to a carrier which is movable along a length of the base.

16. The system of claim 15, wherein the base is made of tempered, safety glass and the at least one laser scanning unit emits a fan of laser light through the glass to measure the undersurface and sides of the foot.

17. A system for forming a custom-made insole, comprising:

at least one scanning station for supporting a foot to be measured, the at least one scanning station including a base having a length for supporting the foot, and at least one movable laser scanning unit for determining coordinates of an undersurface of the foot by directing at least one line of laser light along the undersurface, the at least one laser scanning unit including a first and second side portion extending upwardly from the base along the length thereof;

at least one insole-milling station in communication with the at least one scanning station, the at least one milling station includes a milling assembly for forming the custom-made insole; and

control means for controlling the operation of the milling assembly based upon the coordinates determined by the at least one laser scanning unit.

18. The system of claim 17, wherein the base, and the first and second side portions are made of tempered glass.

19. The system of claim 18, further comprising a plurality of laser scanning units, wherein a laser scanning unit is movably disposed along the base, the first side portion and the second side portion, respectively.

20. The system of claim 13, wherein the control means is a computer disposed in a lower stand of the at least one insole-milling station.

21. The system of claim 20, wherein the at least one insole-milling station includes a display device and an input device for entering and displaying customer information.

22. The system of claim 13, wherein the milling assembly is disposed in an upper unit of the at least one insole-milling station.

23. The system of claim 22, wherein the milling assembly includes a tray for removably mounting an insole blank thereto and a router for milling the insole blank.

24. The system of claim 23, wherein the router is movably disposed within the milling assembly to move along a first axis of movement whereby the router moves along a length of the insole blank.

25. The system of claim 24, wherein the router is movably disposed in the milling assembly to move along a second axis of movement to vary the depth of milling along the insole blank.

26. The system of claim 25, wherein the tray is movably disposed within the milling assembly to move along a third axis of movement such that the insole blank can be milled along a width thereof.

27. The system of claim 26, further comprising a plurality of stepper motors in communication with the computer, wherein one stepper motor controls the movement of the router along the first axis of movement, a second stepper motor controls the movement of the router along the second axis of movement and a third stepper motor controls the movement of the tray along the third axis of movement.

28. The system of claim 13, further comprising vacuum means disposed in the at least one insole-milling station for removing particles produced during milling of the insole.

29. The system of claim 28, wherein the vacuum means includes an air plenum having an entrance located at the milling assembly.